Chapter 5

The Working Cell

Chapter Objectives

Opening Essay

Explain how organisms produce and use bioluminescence to attract mates or prey, repulse predators, or communicate.

Membrane Structure and Function

5.1 Describe the fluid mosaic structure of cell membranes.

5.1 Describe the diverse functions of membrane proteins.

5.2 Relate the structure of phospholipid molecules to the structure and properties of cell membranes.

5.2 Explain how the properties of phospholipids spontaneously form membranes.

5.3 Define diffusion and describe the process of passive transport.

5.4 Explain how osmosis can be defined as the diffusion of water across a   
membrane.

5.5 Distinguish between hypertonic, hypotonic, and isotonic solutions.

5.5 Explain how animal and plants cells change when placed into hypertonic or   
hypotonic solutions.

5.6 Explain how transport proteins facilitate diffusion.

5.7 Describe the function of aquaporins in cell membranes.

5.8 Compare the processes of facilitated diffusion and active transport.

5.9 Distinguish between exocytosis, endocytosis, phagocytosis, pinocytosis, and   
receptor-mediated endocytosis.

Energy and the Cell

5.10 Define and compare kinetic energy, potential energy, chemical energy, and heat.

5.10 Define the first and second laws of thermodynamics. Explain how these laws of thermodynamics relate to energy use in a cell.

5.11 Define and compare endergonic and exergonic reactions. Explain how cells use cellular respiration and energy coupling to survive.

5.12 Describe the three main types of cellular work.

5.12 Explain how ATP functions as an energy shuttle.

How Enzymes Function

5.13 Define activation energy and explain how enzymes speed up chemical   
reactions.

5.14 Describe the structure of an enzyme-substrate interaction.

5.14 Explain how the cellular environment affects enzyme activity.

5.15 Explain how competitive and noncompetitive inhibitors alter an enzyme’s   
activity.

5.15 Describe the process of feedback inhibition.

5.16 Explain how certain drugs, pesticides, and poisons can affect enzymes.